



THE Louis Berger Group, INC.

# GULF OF MEXICO OIL SPILL RESPONSE, RECOVERY & RESTORATION

Statement of Qualifications



# The oil spill in the Gulf of Mexico

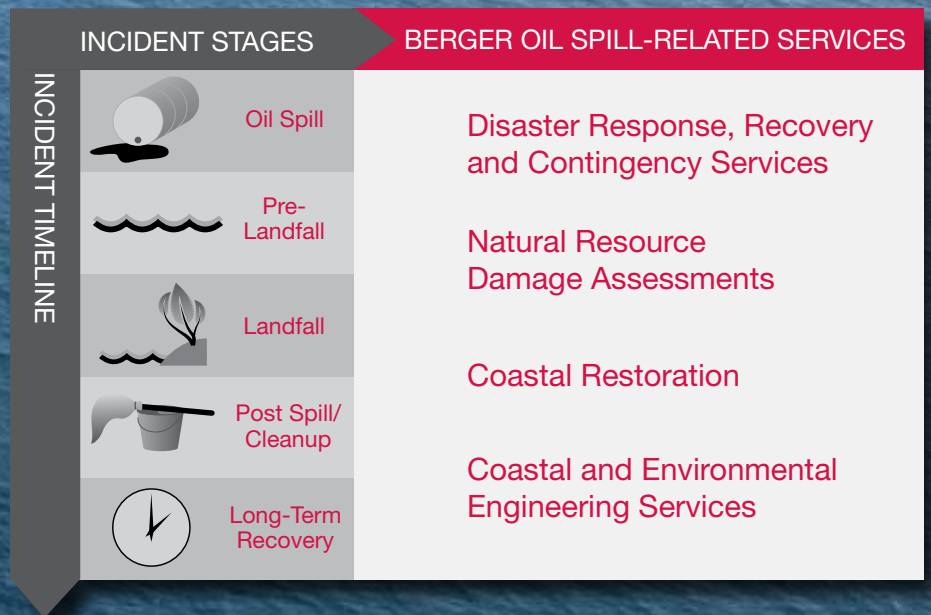
has already, and is continuing to have, significant impacts on people's lives and natural resources. Lessons learned from other oil spills indicate that the ramifications of this spill will be severe and long-term. Successful lessons learned in dealing with other oil spills should be applied to keep the damage to a minimum, and to assist in a rapid recovery. The staff of the Louis Berger Group Inc. (LBG) is ready to assist in all aspects of this disaster.

Decisions to mobilize and execute during all stages of an oil spill are critical to the outcome. Specifically, there are four key areas of expertise for assistance: **Disaster Recovery and Contingency Services; Natural Resource Damage Assessments; Ecosystem Restoration; and Environmental Engineering.** Each of these areas is described in more detail below.

**Cover Image:**  
Crews prepare oil booms to control the flow of leaked oil from Deepwater Horizon.  
*US Coast Guard*

**Background Image - This Page:**  
Vessels monitor oil spill near Venice, LA.  
*US Coast Guard*

**Figure 1 (below):**  
LBG oil spill-related services.



**THE Louis Berger Group, INC.**

The Louis Berger Group, Inc. is an international consulting firm that provides environmental planning and science, engineering, program and construction management, and economic development services. We are a devoted and trusted partner to federal, state, and local government agencies; multilateral institutions; and commercial industry. To this diverse client base we bring strategic vision and an entrepreneurial spirit, developing innovative solutions to some of the world's most challenging problems. Founded by Dr. Louis Berger in 1953, the firm has grown to a significant resource base of more than 5,000 professionals and affiliate employees with more than 80 offices throughout the United States and other parts of the world. As a result, we are able to respond to local conditions while providing clients with the technical resources and rapid response capabilities of a leading global organization.

# Key Experience and Advantages

LBG's key staff consists of highly skilled professionals with decades of experience. Specifically, for the current oil spill in the Gulf of Mexico, we offer the following best value:

## **Oil Spill Natural Resource Damage Assessment (NRDA) Experience:**

Our professionals have more than 25 years of experience in all phases of NRDA including high visibility nationwide activities related to oil and other contaminants. For the Arthur Kill incident in New York Harbor, LBG completed NRDA services and 5-year monitoring for the restoration effort. Working with the National Oceanic and Atmospheric Administration (NOAA), the U.S. Fish and Wildlife Service (USFWS), and other trustees, LBG has completed several restoration projects funded from oil spill incidents.

**Disaster Response, Recovery, and Contingency Services in our New Orleans Office:** We have an office in New Orleans, Louisiana, which is fully equipped to mobilize in any sort of response, recovery or logistics support needs. LBG conducted program management support for funding of the long-term recovery from Hurricanes Katrina and Rita through this same office.

**Gulf Coast Experience:** LBG has experience in the Gulf Coast region providing emergency response and long-term recovery services in New Orleans, Louisiana (Hurricanes Katrina, Rita and Gustav), and Galveston, Texas (Hurricane Ike); natural resource disaster recovery in Big Thicket National Park-Beaumont, Texas; ecosystem restoration services at Jean Lafitte National Historic Park and Preserve south of New Orleans and in the Florida Everglades; and planning services on South Padre Island, Texas.

## **Large-scale, High-profile, Federal Projects with Diverse Stakeholders:**

LBG has worked extensively with federal agencies on large-scale, high-profile, controversial projects for the federal government, such as the Missouri River Ecosystem Restoration Project, or the U.S. EPA Post-Katrina Asbestos Abatement and Demolition Pilot Project.

**Federal Clients/Contracts:** Several of our federal clients may play a role in the Gulf Coast oil spill, including NOAA, U.S. Environmental Protection Agency (EPA), U.S. Army Corps of Engineers (USACE), the National Park Service (NPS), and USFWS. LBG has successfully executed Indefinite Delivery-Indefinite Quantity (IDIQ) projects with all of these agencies.

**Expert Witness Experience:** LBG's experts have experience in providing expert witness testimony which may be needed in this oil spill.

# Significant Projects and Clients

LBG has experience relevant for this oil spill and has working relationships with federal agencies that respond to these events; additional project examples are presented in throughout the document.

**Arthur Kill Oil Spill – Exxon 1990:** Working jointly for the States of New Jersey and New York, LBG completed a 12-month natural resource damage assessment for one of the largest oil spill in New York Harbor. A multimillion dollar fine was levied against Exxon; funds were used for an ecosystem restoration program for the affected area.

## **National Oceanic and Atmospheric Administration (NOAA) Miscellaneous Environmental Restoration Projects IDIQ:**

LBG has engaged in 40 task orders for facility replacement for the NOAA Pascagoula, Mississippi, facility damaged in Hurricane Katrina. These task orders included emergency response; Damage, Assessment, Remediation, and Restoration Program (DARRP)-funded coastal restoration; hazardous material emergency response at the Florida Keys Marine Sanctuary; ecosystem assessment; ecosystem restoration design; oyster reef design; and National Environmental Policy Act (NEPA) document preparation.

**Canal Restoration – Jean Lafitte National Historical Park and Preserve, Louisiana:** LBG assisted the NPS with planning engineering, surveying, permitting, and complying with NEPA in a project that will restore over 20 miles of oil field canals and disturbed wetlands to floating marsh. This unique ecosystem is the only example of an estuarine floating marsh in the national park system, and one of only four large estuarine floating freshwater marsh systems in the world and could be affected by the current Gulf Coast oil spill.

**Lincoln Park NOAA Restoration:** In association with NOAA and Hudson County, LBG assisted the New Jersey Department of Environmental Protection (NJDEP) in the restoration of 40 acres of tidal wetlands and remediation and redevelopment of a landfill for active recreation use. LBG led the team to design a tidal marsh in the 270-acre Lincoln Park as part of a new waterfront improvement and golf course development project. The project (currently under construction) has been awarded \$10.6 million in NOAA Coastal and Marine Habitat Restoration funds under the American Recovery and Reinvestment Act (ARRA) of 2009 as well as \$2.3 million in oil spill settlement funds from the Harbor Spill Restoration Committee, which is comprised of the USFWS, NOAA, and NJDEP. These funds are being used to restore marine resources that were injured due to oil spills in the Hudson Raritan Estuary. The site was visited on the 2010 Earth Day by the U.S. Department of Commerce Secretary Gary Locke, the USACE New York District Commander Col. John R. Boulé II, and NOAA's Project Manager Carl Alderson ([www.noaa.gov/earthday/lincolnpark.html](http://www.noaa.gov/earthday/lincolnpark.html)).





## Disaster Response, Recovery and Contingency Services

LBG is an internationally recognized consulting firm with over 20 years of worldwide disaster response, recovery and contingency service experience. Services provided include environmental, engineering, architecture, program and construction management, planning, science, industrial hygiene, emergency management and training/exercises, contingency supplies, economic development, and capacity-building services during the response phase (days and weeks) and the recovery phase (months to years) after a natural or human-caused disaster. With our resource base of 4,000 employees, we are able to rapidly deploy the appropriate personnel anywhere in the world and respond to local post-disaster challenges and conditions regardless of the type or location of a disaster. LBG has established a post-disaster deployment database to track all personnel who are available and ready to deploy to the Gulf and assist in the response and recovery efforts.

**Background Image:**  
Response workers prepare an oil boom to contain the oil leaking into the Gulf.  
*US Coast Guard*

GULF OF MEXICO OIL SPILL  
RECOVERY QUALIFICATIONS

DISASTER RESPONSE,  
RECOVERY AND  
CONTINGENCY SERVICES

LBG offers a diverse range of post-disaster and contingency services during both the response and recovery phases that may be required for the Gulf oil spill, including but not limited to the following:

## Response-Phase, including Contingency Services

### Representative Experience

A few of our highest profile **disaster response and/or recovery program** support assignments include the Exxon oil spill in the Arthur Kill (NY/NJ) estuary, multiple hurricane/flood responses, the Mount Pinatubo Volcano eruptions (multiple) on the island of Luzon in the Philippines, the Haiti earthquake, and the 2001 World Trade Center, and anthrax terrorist attacks.



Above  
Aftermath of Hurricane Katrina prompting LBG's involvement in recovery efforts.

**Emergency/Spill Response:** Through our nationwide network of more than 100 national, regional and local partners with current Master Services Agreements, LBG can respond within hours to any type of emergency anywhere in the U.S. with the appropriate equipment and personnel, including all resources necessary to quickly deal with petroleum or chemical spills, hazardous material release, wind or seismic damage, or water-related problems.

**Industrial Hygiene and Safety Monitoring During Response:** Exposures of the public and/or workers to chemical or other hazardous materials/conditions is typically a major concern during emergency response and hazardous spill clean-up situations. LBG's team of industrial hygienists and other health/safety trained professionals can provide appropriate health and safety plans and OSHA-compliant monitoring to ensure the safety of potentially exposed individuals.

**Oil-soaked Debris Management and Waste Disposal:** Debris and hazardous/solid waste management associated with oil spills and other disasters are often a major challenge and cost factor. LBG has specialized experience in the rapid development and implementation of debris management plans, monitoring programs, and RCRA-compliant waste transportation/disposal.

**Rapid Infrastructure Assessment (including Waterfront/Hydraulic System):** LBG specializes in Rapid Infrastructure Assessment (RIA), and has provided RIAs in the most challenging and remote environments. RIA involves quick deployment of infrastructure specialists to provide technical services to determine short- and mid- to long-term repairs and improvements needed after a disaster – specifically including waterfront, beach/coastal and hydraulic/tide control, and wastewater/drainage outfall infrastructure that can be adversely impacted by oil spills and require maintenance or repairs. The initial goal is to provide feasible solutions and rapidly restore the impacted infrastructure to functional levels. RIA applies an interdisciplinary approach leveraging local LBG offices and/or other forward deployed key personnel with specific expertise as required.

**Logistics, Supply/Procurement and Other Contingency Services:** LBG can provide comprehensive contingency services and post-disaster logistics capabilities that run the full gamut applicable to oil spill and other responses where remote coastal/island work site and camp set-up and maintenance/sustenance may be required. This specifically includes providing our clients with anything they need at these remote sites, including contingency power and lighting, mobile office units, temporary shelters (from tents to trailers or semi-permanent housing units), ice, food, and clean water. Should private residences be impacted as well, LBG can also provide contingency shelter, power, lighting, food, ice and water for these individual assistance needs.

GULF OF MEXICO OIL SPILL  
RECOVERY QUALIFICATIONS

**DISASTER RESPONSE,  
RECOVERY AND  
CONTINGENCY SERVICES**

## Recovery-Phase Services

### Recovery Project Scoping, Cost Development, and Compliance:

LBG's environmental, infrastructure and facilities planning, science and engineering expertise are often applied after a disaster to help clients develop and prioritize repair/rehabilitation and long-term recovery projects. LBG's environmental and regulatory compliance expertise is also valuable for ensuring compliance with the myriad of laws and regulations that may apply, including:

- National Environmental Policy Act (Categorical Exclusions, EA, EIS)
- Clean Water Act
- Endangered Species Act
- Clean Air Act
- National Historic Preservation Act
- Coastal Zone Management Act
- Executive Orders:
  - Executive Orders 11514 and 11991, Protection and Enhancement of Environmental Quality
  - Executive Order 11990, Protection of Wetlands
  - Executive Order 11988, Floodplain Management
  - Executive Order 12898, Environmental Justice
  - Executive Order 13045, Protection of Children from Environmental Health Risks and Safety Risks

### Coastal (Beach/Habitat) and Waterfront Environmental Science, Hydrodynamic Assessment/Modeling and Alternatives/Impact Study Services:

Our scientists, engineers and modelers have a detailed understanding and significant impact assessment, mitigation and modeling experience relevant to coastal, riverine and estuarine hydrodynamics and wave impact, as well as fate/transport of oil spills in the environment. Specific to marine oil spills and other disasters that impact beaches, coastal habitat and waterfront facility infrastructure itself, LBG has the in-house resources and expertise to plan, design, estimate and oversee all aspects of coastal and waterfront projects that include beach/dune nourishment, and coastal habitat and facility disaster mitigation projects.

**Post-Disaster Recovery and Waterfront Reconstruction Planning, Architecture, Engineering and Construction Management:** As one of the world's largest planning, design and construction management consulting firms, LBG specializes in multi-disciplinary coastal/habitat, infrastructure and facilities services, and can provide a full range of professionals and specialists for the development, design and implementation of long-term mitigation, restoration, repair and improvement projects that typically occur after a disaster.

**Economic Recovery Assessment, Planning and Redevelopment Assistance:** The importance of integrating socioeconomic impact assessments and recovery is equal to the importance of physical and environmental recovery. LBG is known for its ability to incorporate this critical element of recovery into its programs and projects, specifically including but not limited to capacity building/re-building, micro-finance, occupational training/counseling and small business and community grant management.



**Images, Top to Bottom**  
Phase I Site Investigation for Salt Marsh Restoration Study

Canal Reclamation at Jean Lafitte National Historical Park and Preserve, Barataria Preserve Unit

Missouri River Ecosystem Restoration Plan, Missouri River Basin

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GULF OF MEXICO OIL SPILL  
RECOVERY QUALIFICATIONS

**DISASTER RESPONSE,  
RECOVERY AND  
CONTINGENCY SERVICES**

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## Representative Experience

### Recovery and restoration support more specific to natural resource damage recovery

has included multiple projects and programs for the National Oceanic and Atmospheric Administration, New Jersey Department of Environmental Protection, USEPA, USACE, the U.S. Navy, the U.S. Air Force, the U.S. Agency for International Development, the U.S. Department of Energy, the NPS, the U.S. Department of Justice/Homeland Security, U.S. and state/local transportation agencies, and the U.S. Postal Service.



### Disaster-related Public Assistance Grant Applications, Document Management, Eligibility Evaluations, and Appeals:

LBG works with both federal (e.g., FEMA) and non-federal (state/local/private non-profits) entities that are eligible for disaster assistance funds. For qualified non-federal entities impacted by a federally-declared disaster (i.e., state and local governments/communities and Private Non-Profit's [PNPs]), LBG can assist recovery project funding and development following a disaster in support of public officials, planners, and community members who are implementing short- and long-term programs to ensure a disaster-resilient and economically stable future. LBG's qualified and dedicated staff includes public assistance and mitigation specialists, cost estimators/engineers, document/project control system specialists, and emergency managers and planners, who understand and know how to incorporate all available federal, state and local programs into the recovery process. Our specialists also are very experienced in managing associated projects/documentation, and in appealing or arbitrating adverse funding determinations for clients who feel that they have wrongly been denied funding assistance.

**Insurance Recovery:** LBG can assist government and private insurance policy holders with the evaluation of coverage and the realization and documentation of maximum insurance claims proceeds.

**Expert Witness Experience:** LBG's experts have experience in providing expert witness testimony which may be needed in litigation activities.

**Marine, Land and Air Transportation Planning and Engineering:** As a firm with worldwide multi-modal transportation resources and experience, LBG can support any and all types of marine, land and air transportation planning, engineering and infrastructure system projects and programs from assessments, design and reporting through bidding, construction and operations.

**Hazardous and Solid Waste Management:** LBG can provide full-service hazardous materials/waste and solid waste management capabilities, supporting site assessments, sampling/testing, investigations (water, sediments, soils, groundwater, building materials, and air), remedial and control alternatives assessments and feasibility studies, and remedial and corrective action design through construction and long-term operations/maintenance.

**Lessons Learned and Emergency Preparedness Training and Exercises:** Before, during and after major disasters, LBG's emergency planning and preparedness experts can assist clients with the process of learning from past disasters (i.e., assessing what went right, and what went wrong), and then properly planning, training and exercising to more effectively manage future disasters. Services can range from standard training (incident management, health/safety, etc.) to table-top exercising and plan development, to full-scale multi-agency disaster exercises in compliance with the National Response Framework, NIMS, OSHA, HSEEP and other programs.

**Comprehensive Program Management Services:** Through either staff augmentation or full owner's representative program management contracts, LBG supports some of the largest and most diverse and challenging programs in the world from the Downtown Recovery Program after the World Trade Center attacks in New York City, to post-conflict recovery and reconstruction in Iraq, Afghanistan and Sudan. As part of this service, LBG has developed and can apply state-of-the-art document control and project management information system (PMIS) tools, as well as 3-D and 4-D project visualization modeling to provide a means of seeing and evaluating how a particular project or program will unfold over time and what the end-condition will look like.

GULF OF MEXICO OIL SPILL  
RECOVERY QUALIFICATIONS

DISASTER RESPONSE,  
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As a result of this varied and extensive history, LBG's experience and resources are now very broad. We have well over 200 specialists focused on these services, and specific expertise pertaining to virtually every type of situation and site, including disaster response and recovery, public infrastructure, fuel spills and management, waste removal/transport/disposal, utility and transportation facilities, commercial buildings, military bases and other government installations, contaminated soils, waters and/or sediments, energy plants/facilities, airports, ports/navigable waterways, flood management, and coastal environments.

## Representative Experience

**Longer-term infrastructure and economic recovery program** support has also been provided in New Orleans (LA), Galveston (TX), New York City (Downtown Recovery Program), Afghanistan, Iraq and Sudan.



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RECOVERY QUALIFICATIONS

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RECOVERY AND  
CONTINGENCY SERVICES**

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## Natural Resource Damage Assessment (NRDA)

LBG has the capability to perform all the components of a successful cooperative natural resource damage claim on behalf of a natural resource trustee. This includes not only the analysis, determination, and presentation of the economic values associated with lost non-market resources, but it also includes the physical science of natural resources present and lost as well as the planning efforts in restoring the resource to its baseline condition.

The massive oil spill has already impacted, or has the potential to impact, many different kinds of resources, livelihoods, and economic activities, such as the following:

- National Parks
- Wildlife Refuges
- Fishing grounds
- Sensitive wetland ecosystems
- State and municipal parks, beaches, and other waterfront recreation areas
- Ports and marinas
- Commercial shipping
- Public and private property

**Background Image:**  
Oil plume from Deepwater Horizon indicates the potential extents of the impact.  
NASA

GULF OF MEXICO OIL SPILL  
RECOVERY QUALIFICATIONS

NATURAL RESOURCE  
DAMAGE ASSESSMENTS

Public resources—those not owned in the private sector—belong to the people at large and are represented and administered by natural resource “trustees.” Trustees of specific resources may be NOAA, the USFWS, the NPS, state governments, or tribal governments. Responsibilities as Trustees arise under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), 42 U.S.C. § 9601 et seq.; the Federal Water Pollution Control Act, 33 U.S.C. § 1251, et seq. (also known as the Clean Water Act or CWA), the Oil Pollution Act (OPA) of 1990, 33 U.S.C. §2701 et seq.), and other applicable federal or state laws, including Subpart G of the National Oil and Hazardous Substances Contingency Plan (NCP).

In essence, these laws provide for two interconnected actions. First, Potentially Responsible Parties (PRPs) are required to clean up the contaminated environment, restoring the public resource. LBG’s extensive qualifications and experience in planning and conducting restoration activities is described below.

Second, Congress recognized that cleaning up the resource alone was not sufficient to compensate the public for its losses. Public resources provide services to the public at large such as recreation in a park, habitat and food for wildlife in a marsh or refuge, natural filtration actions of a wetland, and general public values in enjoying the resource or merely knowing that it there for use or viewing should they so desire. Natural resources include fish, plants, birds, other wildlife and their habitats, soil, and both surface water and groundwater. The PRP is required to compensate the public for the lost uses of the resource pending its cleanup.

Public resources, by their very definition, are not subject to valuation in conventional markets. Congress also recognized this and required the Department of the Interior (under CERCLA) and NOAA (under OPA) to develop and adopt regulations (the Regulations) dealing with methods by which to determine the value of the non-market uses of these resources.

The resulting activity is a natural resource assessment or NRDA. Though not required by the Regulations, responsible parties are encouraged to participate in a cooperative damage assessment and in restoration planning activities. By focusing on restoration early in the process, risk and injury assessments can be integrated with cleanup and restoration planning. This offers industry a practical and cost-effective way to resolve liability while making the public whole.



The Regulations provide that the basic “measure” of damages is the cost of restoring, rehabilitating, replacing, or acquiring the equivalent of the damaged natural resources, diminution in value of the natural resources while the resource is recovering along with costs of conducting an NRDA. Damages are calculated from the baseline condition of the resource in a “but-for the injury” state. The PRP is responsible for restoration of injured resources to their baseline level. They are then responsible to compensate the public for reductions in the value of resource services pending recovery of the injured resources.

As a starting point in any NRDA, baseline services must be determined. LBG’s experience in natural resource planning as well as in resource recovery activities is integral to the efficient determination of damages especially in a cooperative NRDA process. Not only does LBG have the ability to perform the economics-based part of the process, but we *also provide the biological, physical, and planning components of a successful restoration of the complete suite of public values lost.*

# The Natural Resource Damage Assessment Process

NOAA, through DARRP, responds to incidents of contamination such as oil releases. The response is conducted through the NRDA process and includes the assessment of risk and injuries, the approach used for the restoration of affected resources, and the extent of restoration required. Steps in the NRDA process include the following:

**Preliminary Assessment:** Collection of time-sensitive data and review of baseline information related to the spilled substance.

**Injury Assessment/Restoration Planning:** Economic and scientific studies to quantify the extent of the damages, injuries to natural resources, and the loss of services. These studies also form the basis for restoration plans.

**Restoration Implementation:** Restoration might include restoring wetlands, removing contaminated sediment, and rehabilitating ecological resources.

LBG has the experience to address all aspects of NRDA:

## Conduct of NRDA and Economic Valuation

LBG professionals have been involved in the NRDA process literally, from its very beginning. **Keith Eastin, a Vice President of LBG, is the former Deputy Undersecretary of the U.S. Department of the Interior and was its chief environmental counsel.** At the Interior he organized and directed the CERCLA 301 team that conceived of and drafted the Regulations providing for the Assessment of Damages to Natural Resources under Superfund and other acts. Valuing natural resources will be a key factor in connection with governmental activities in the Gulf. Other economics professionals working with LBG in the natural resource damage area have developed natural resource damage values for potential oil spill impacts on NPS beaches and historic sites on the eastern seaboard, and worked with the state of Montana on NRDA for the Montana Clark Fork River Superfund sites. One such professional was the lead economist for native groups and sportfishers in the Exxon Valdez case. This project entailed valuation of the subsistence use of salmon and other natural resources by Alaska natives, and valuation of sportfishing. Additional experience included the analysis of a multibillion dollar NRDA associated with groundwater contamination in the southwestern United States. Analyses included evaluation of water replacement models, hedonic regression analysis, and lost state tax revenue claims.

## Representative Experience

An Eastern state retained Mr. Keith Eastin, Vice President at LBG, to assist in structuring a program to foster non-litigated settlements of natural resource damage claims. Also, he has worked with a large Western state to create a geographic information system (GIS)-compatible database of its more than 1,000 hazardous waste sites for purposes of identifying the state's natural resource damage problem areas and structuring a program for their settlement.



Above:  
Wildlife injury assessment.

GULF OF MEXICO OIL SPILL  
RECOVERY QUALIFICATIONS

NATURAL RESOURCE  
DAMAGE ASSESSMENTS

## Representative Staff

**Mr. Eastin** has valued the entire non-income producing natural resource inventory of a Northwest state in connection with the development of its Asset Stewardship Plan. Significant timber assets of the state were valued on an income-stream basis. He then directed the valuation of the remaining non-market assets of the state. These included forest and nature preserves, fishing, hunting, and outdoor recreation opportunities. Aquatic resources—including marketed assets such as boat launching facilities and commercial clam beds—were valued, as were their non-market components such as wetlands and streams.



Above:  
Northwest Forest  
*Bogdan Migulski*

## Physical Resource Data Development and Restoration Planning

A critical element of any NRDA is solid representative data for the specific damages being assessed. To determine the impact of an event, pre- and post-event data are critical. Data development efforts may involve field work, mapping, literature surveys, and/or modeling. Collected data need to be analyzed in a clear and concise manner, often utilizing GIS for presentation. Further, such data need to be defensible in court. We also have extensive experience in ecological restoration and sediment mitigation described in the document below.

LBG has used a range of methods in the past, including Habitat Equivalency Analysis (HEA), Resource Equivalency Analysis (REA), lost biomass from mortality and production foregone, and service-to-service and value-to-cost for lost use services, depending on the injured resources and services. Once the appropriate damage assessment method has been selected, injury quantification and restoration scaling can be undertaken. The resulting damage estimate may be expressed as a range with associated estimates of probability and shall be given in terms of ‘discounted service acre years’ (DSAYs) or other non-monetary units.

Injury quantification generally consists of the following steps, some of which can conceivably be carried out by the PRP:

- Synthesize the existing data to identify which resources and habitats have been injured.
- Develop the injury categories for the affected habitats and resources, organizing them in different degrees of injury as appropriate.
- Identify the ecological functions and services of each injured resource.
- Identify the metrics to use as inputs to the HEA/REA or other selected model for lost ecological services and functions.
- Predict the behavior and fate of oil over time, using this as the basis for estimating duration of exposure and recovery rates of affected resources and habitats.
- Develop inputs into the HEA or other selected model for habitat injuries and calculate the injury as appropriate (for example coastal marshes in terms of DSAYs).
- Develop inputs into other injury quantification approaches and calculate the injury as appropriate (e.g., fish/shellfish biomass).

## Expert Witness Experience

LBG's senior staff has experience in providing expert witness testimony in court, in support of their own studies, or as part of an evaluation of studies prepared by others. LBG can provide support for negotiation and/or litigation of the NRDA issue/claim with the PRP, as and when directed on a stand-by basis. Based on our experience, this type of support could include but certainly may not be limited to the following:

Technical support to legal and/or regulatory research efforts for case law and/or enforcement precedence.

Advice as to the quality and sufficiency of PRP-generated documents and/or the Trustees' technical and economic evidence with respect to the several aspects of the case.

Preparation of legal and procedural documents (e.g., technical or factual portions of Consent Decree) or exhibits.

Participation in negotiations with the PRPs, their representatives, and/or representatives from other case participants (e.g., representatives of the court).

Technical and economic evaluation of any other project or technically related reference materials, documents, evidence, testimony, or proposals.

Field visits, meetings, depositions, and/or in-court testimony as advisory consultant or technical/fact witnesses.



## Representative Experience

The work by Mr. Keith Eastin, Vice President at LBG, has included activities at **significant hazardous waste and Superfund sites with potential natural resource damages ranging up to \$100,000,000.**

He served in a key consulting role in the landmark state/industry cooperative NRDA for the PCB contamination of a major Midwest river. He has advised, with respect to the petroleum contamination of sensitive fishing grounds off an eastern state, and has assessed damages from activities associated with the Department of Energy's activities at Oak Ridge National Laboratory. He has assessed damages for the contamination of a major aquifer by a 2.5 million-gallon petroleum spill in Nevada, contamination resulting from a break in a primary petroleum pipeline in the Midwest, and the dioxin contamination of Native American natural resources associated with an Eastern river.



GULF OF MEXICO OIL SPILL  
RECOVERY QUALIFICATIONS

**NATURAL RESOURCE  
DAMAGE ASSESSMENTS**

## Representative Experience

LBG performed an **NRDA for the Arthur Kill oil spill** that ultimately contributed to a \$15 million settlement between Exxon and the States in New York and Jersey. Services included spill extent mapping; sediment chemistry; and biological impact assessments of invertebrates, mussels, and birds.



## Tribal Consultation

During the past 20 years, LBG has established and maintained a working relationship with more than 20 different Native American Tribes. LBG's senior preservation planners have experience with tribal consultation, scoping tribal issues, analyzing impacts of proposed project on tribal resources, and developing agreements to address tribal issues on numerous projects. LBG's cultural resources staff has experience working with State Historic Preservation Offices (SHPO) in Texas, Louisiana, Mississippi, Alabama, and Florida, and has completed cultural resource investigations in all five states. LBG staff also has experience with tribal consultation, scoping tribal concerns, analyzing impacts of proposed project on tribal resources. Eleven federally recognized tribes currently reside within the five Gulf Coast states and many other tribes who currently reside elsewhere are considered to have traditional or historic cultural interests in the region. Among resident tribes, those who have their own Tribal Historic Preservation Office (THPO) and may assume the responsibilities of the SHPO for purposes of Section 106 compliance on tribal lands, include the Tunica-Biloxi Tribe of Louisiana (LA), the Poarch Band of Creek Indians (AL, FL), and the Seminole Tribe of Florida (FL). There are also a number of State Recognized Tribes or tribal organizations that may request consultation as part of the environmental review process.

## Coastal Restoration

LBG provides years of experience in wetland and terrestrial ecosystem studies and restoration. LBG scientists and engineers collaborated on the design of over 33,000 linear feet of freshwater stream restoration and over 10,000 acres of tidal and freshwater wetlands restoration, and developed and implemented monitoring and assessment programs for these and other numerous mitigation projects nationwide. We recognize the importance of joining the biological tenets of restoration ecology with the best engineering design principles and practices to successfully restore aquatic, estuarine, and terrestrial ecosystems. We believe that the underlying physical and biological processes are the foundation of successful and sustainable restoration projects, and that these processes serve as the primary focus of a project design. Adopting the most effective and cost-efficient engineering practices provides the means to achieve success.

The potential impact to tidal, estuarine marshes from the oil spill in the Gulf could be extensive. A calculated and quantitative approach to restoration and mitigation for oil spill damages will be needed to restore ecosystem functions, services, and benefits to the public. An additional consideration is the current and extensive ongoing federal, state, and local planning and coastal restoration efforts. For over two decades, the USACE and the state of Louisiana have planned the Louisiana Coastal Areas Study. Phase one of the study has been authorized. The Louisiana Office of Coastal Protection and Restoration (OCPR) was established by the Governor of Louisiana in 2008. A number of agencies (USACE, NOAA, NRCS, USFWS, USEPA) coordinate, plan and implement projects in concert with parishes and variety of stakeholders.



**Above:**  
Coastal America SPIRIT AWARD for efforts on the Woodbridge Creek and Joseph Medwick Marsh Project Teams

**Background:**  
Missouri River  
USACE

## Representative Staff

**Dr. Ed Theriot** is a native of Southwest Louisiana and served as Director of the Environmental Laboratory, Engineer Research and Development Center and Program Director for the Mississippi Valley Division, Corps of Engineer. He established the System-Wide Research Programs for the development of technology for restoring large systems and was an architect of the Louisiana Coastal Area study for the restoration of coastal Louisiana.



## Representative Experience

For NOAA, LBG is planning the **restoration of Marsh Island**, a 22-acre peninsula in New Bedford Harbor in Fairhaven, MA. The salt marsh restoration will provide ecological services and passive recreation opportunities. The project includes baseline investigations regarding hazardous materials, soils, wetlands and wildlife habitat and preliminary tidal wetland restoration design.



LBG is uniquely positioned to lead remediation/mitigation efforts that will be required to compensate for oil spill damages. LBG can provide the leadership, the local experience, and relationships needed for a project of this size and complexity. Potential services may include:

## Stakeholder Involvement

The Gulf Coast oil spill threatens natural resources and raises health and safety concerns for a wide array of stakeholders including federal, state, and local agencies, residents, commercial fishermen, and the tourism industry, to name a few. BP, federal, state, and local efforts to mitigate damages for the Gulf Coast oil spill will include broad stakeholder involvement, typical of large ecosystem restoration projects. In addition, planning should be guided in the context of the current USACE and LOCPR efforts. LBG is uniquely positioned to provide the leadership, and our experience in managing similar large-scale projects can be applied here. LBG is currently managing the Missouri River Ecosystem Restoration Project (MRERP), the second largest ecosystem restoration effort in the United States. This collaborative effort is led by the USACE Kansas City and Omaha Districts and the USFWS. The goal of the MRERP is to identify and guide the actions needed to restore ecosystem function, mitigate habitat losses, and recover native fish and wildlife on the Missouri River while simultaneously seeking to enhance social, economic, and cultural values for future generations. MRERP will require coordination with 15 federal agencies, 10 state governments, 29 tribal interests, and a wide range of local government stakeholders. These groups include the Missouri River Recovery Implementation Committee (MRRIC), a group of stakeholders defined in the Water Resources Development Act (WRDA) of 2007.

## Ecological Risk Assessment

For the Gulf Coast oil spill, baseline conditions will be critical to distinguish pre- and post-spill conditions. This includes collecting pre-spill baseline data and/or reviewing existing pre-spill baseline data. LBG provides a multidisciplinary team for ecological risk assessment in tidal and coastal environments. Our ecologists, avian specialists, botanists, engineers, and geologists have been involved in sampling for contaminants (oil, PCB, mercury) in post-incident environments. For the Exxon Valdez, the Arthur Kill Oil Spill, and related damage assessment relief funded restoration projects, LBG staff collected baseline data for vegetation, soils, birds, mammals, wildlife, fish, shellfish, invertebrates, herpetiles, and habitat conditions. Developing and implementing a sound, quantitative sampling program to collect data that documents the impacts of an oil spill will be crucial to recovery and restoration efforts. LBG has the staff experience and capabilities to support this work.

Mapping the areas affected by the oil spill along with classifying habitat types and other data layers related to pre- and post-spill conditions for fish and shellfish abundance, vegetation, substrate, and other features will be required as part of an NRDA assessment. LBG has capabilities to complete GIS mapping, create three-dimensional (3D) models and comprehensive databases, and develop web-based applications. Using the most current

spatial applications and industry best practices, LBG has enabled and enhanced inter-organizational communication within a variety of business environments.

Oil spill impacts and mitigation can be quantified using the Wetland Value Assessment (WVA). Outputs are derived from a subjective study of pre-spill, existing, and planned habitats and will likely be quantified as habitat units. LBG has extensive experience in a number of quantitative and qualitative rapid assessment methods and models to assess habitat quality. In addition to the WVA, LBG scientists have employed the Hydrogeomorphic Model (HGM), Habitat Evaluation Procedures (HEP), PA-modified HEP, Indicator Value Assessment (IVA), and others. LBG scientists have also prepared wetland functional assessments of the existing wetlands using best professional judgment, and qualitative methods such as the New England Highway Methodology, Wetland Evaluation Technique (WET), North Carolina Wetlands Assessment Method (NC WAM), Florida Wetland Rapid Assessment Procedure (WRAP), Golet method, Charleston method, and Evaluation of Planned Wetlands (EPW), to name a few. We have recently completed the first HGM for tidal fringe wetlands in the New Jersey Hackensack Meadowlands. This model is planned for use as a decision-making tool by assessing baseline functions of existing wetlands for comparison with alternative restoration concepts to determine the net benefits from each approach, and as a means of determining mitigation requirements for project impacts.

## Coastal Restoration Design

BP remediation/mitigation for oil spill damages will involve coastal restoration efforts that should be coordinated with the USACE and CWPPRA planning and ongoing projects. LBG has an extensive portfolio of small- to large-scale tidal restoration design experience for federal, state, and local agencies as well as private clients. Our current restoration design and construction oversight experience for federal agencies includes projects for NOAA, USACE, NPS, and Natural Resources Conservation Service (NRCS). The Lincoln Park project (completed with NOAA ARRA funds), the Jean Lafitte canal restoration, and the Woodbridge Creek restoration project (a Coastal Spirit award-winning project) were collaborative, multidisciplinary efforts which included design, implementation, and ongoing monitoring. LBG can provide the leadership, the local experience, and relationships needed for a project of this size and complexity. Our construction management staff includes ecologists, soil scientists, hydrologists, geomorphologists, and engineers who recognize critical timing issues that affect restoration work, such as plant material availability and seasonal restrictions (i.e., essential fish habitat, marine life reproductive cycles) to minimize effects to fisheries.

### Representative Experience

For NOAA, LBG prepared construction documents for the **Woodbridge Creek Wetland Restoration**. The restoration was conducted to mitigate for damages resulting from the 1998 Exxon Bayway Oil Spill, as sought after by the state and federal trustees of the NY/NJ Harbor Oil Spill Natural Resource Damage Settlement Fund. LBG developed a series of plans including a maintenance, protection and traffic plan; site preparation plan; grading plan; and planting plan. LBG also designed a confined disposal facility to contain the material to be excavated from the site in accordance with state and federal regulations. In total, this project restored and enhanced 80 acres of high-quality estuarine habitat. In 2007, LBG received the Coastal America Spirit Award for this project.



GULF OF MEXICO OIL SPILL  
RECOVERY QUALIFICATIONS

**ECOSYSTEM RESTORATION**

## Representative Experience

For the NOAA and the New Jersey Department of Environmental Protection, LBG assisted in the **restoration of the Mad Horse Creek Wetland and Coastal Grassland** adjacent to the Delaware Bay. LBG characterized the existing site ecological, hydrological and geotechnical conditions, and designed plans and specifications. The site is being restored as partial compensation for the 250,000 gallon oil spill caused by the grounding of the merchant marine oil tanker Presidente Rivera in the Delaware River in 1989. Impacts caused by the spill included park and fishery closures, and oil deposits along the coastal wetlands and shoreline impacts through 30 miles of river.



## Construction Oversight

LBG's experience in all facets of the development of restoration projects, including developing bid documents, conducting pre-bid meetings, analyzing bids, aiding clients in selecting a contractor, and administering contracts, allows LBG to provide streamlined service to our clients. LBG also has extensive experience in staging projects so that seeding and planting programs are executed within the appropriate seasons without overlapping the construction work and so that gaps between the seeding and construction phases are minimized to prevent site degradation. LBG also has experience in pre-qualifying construction and landscape firms for specific projects. LBG has extensive experience in developing construction plans and specifications for restoration projects gained from over 20 years of mitigation design activities.

## Long-term Monitoring

LBG provides routine and detailed monitoring for ecosystem restoration projects, remediation projects, mitigation banks, and other studies. LBG completed a five-year ecological monitoring program at a NOAA tidal wetlands restoration site as part of a settlement to address natural resource damages resulting from a nearby contaminant release. The LBG team has substantial experience with monitoring mitigation sites for regulatory compliance. Monitoring work has included assessing plant survival and recruitment; invasive species; wildlife, fish, and invertebrate abundance and diversity; contaminant fate and tissue analysis; and hydrology. Our scientists are often called upon to develop and implement adaptive management strategies. In past five years, we have monitored hundreds of acres of restored tidal marsh and other habitats. The Richard P. Kane Wetland Mitigation Bank is a 230-acre tidal marsh restoration site that was designed and permitted by LBG and is currently under construction. The monitoring protocols, including compliance with Federal Aviation Administration (FAA) wildlife hazard assessments, were developed by LBG and will be implemented by our staff this fall.

## Coastal and Environmental Engineering Services

In the Hazardous/Toxic Waste and Contaminated Sediment area LBG provides comprehensive services to evaluate and remediate coastal and estuarine areas impacted by releases of chemical contaminants. These services are uniquely suited to assist in the characterization of sediments, surface water, shoreline soils, and other receptors that may be impacted by releases of oil from the Deepwater Horizon incident in the Gulf of Mexico. LBG's team can provide the following services, which are discussed in further detail in the sections that follow:

Planning document preparation including development of work plans, field sampling plans, Uniform Federal Policy Quality Assurance Project Plans (UFP-QAPPs), and quality management plans

Environmental sample collection for the characterization of contaminated/impacted sediments, sediment porewater, shoreline soils, surface water, and biota, both for remedial planning and long-term monitoring

Selection and supervision of qualified subcontractors for marine geophysical surveys, sediment profile imagery, laboratory services (including on-site analyses, if appropriate), and drilling/vibracoring services, as needed

Pre-spill baseline characterizations via literature review and reference site sampling

Laboratory analysis of samples via team subcontract laboratories, data validation, geochemical data interpretation, and contaminant fate and transport evaluations (including assessments of sediment stability)

Preparation of Human Health and Ecological Risk Assessments, with our team partner Battelle

Development and evaluation of remedial alternatives

Preparation of remedial designs for remedial options including excavation, dredging, capping, in-situ treatment, natural recovery, and combination alternatives

Community outreach services and Community Involvement Plan development and implementation

GULF OF MEXICO OIL SPILL  
RECOVERY QUALIFICATIONS

COASTAL AND  
ENVIRONMENTAL  
ENGINEERING SERVICES

LBG possesses one of the nation's strongest integrated teams for providing contaminated sediment science, engineering, and restoration services. In developing contaminated sediment restoration plans, we maintain three key values: the ecosystem's natural potential, achievable goals, and sustainability. We use state-of-the-art forensic, modeling, and geochemical data evaluation methods to build a sound understanding of contaminant nature and extent, fate and transport, and exposure pathways at each site, also paying special attention to the concerns of local communities and stakeholders to ensure that remedial recommendations can provide long-term protection of restored areas. LBG's experts have been entrusted with key roles on some of the highest profile contaminated sediment sites in the U.S., such as the Hudson and the Passaic Rivers in the greater New York area. Our interpretations of highly complex systems have been tested by independent peer reviewers and stakeholders alike.

## Site Assessments – Pre-Spill and Post-Spill

Sediment assessments will be custom tailored to the individual impacted resources to properly capture the extent of the impact. For example, oil may be bound to sediments at varying concentrations and may penetrate the sediment bed to varying depths, as a result of grain size, resuspension and reworking of the sediments, and other factors. For the Arthur Kill Oil Spill, LBG developed specialized sampling tools to characterize the sediment. Sampling methodologies also need to be developed to incorporate the nature of the substrate. Similarly, the sampling strategy needs to provide an objective representation of the damage to allow for quantification of the impact and the development of appropriate remediation measures.

To assess the impacts and damages from the oil spill on the sediments, water column, shoreline soils, and the associated ecosystem, it will be important to have a clear understanding of the baseline conditions prior to the impact. For this, we recommend a review of existing data from literature and state and local government sources; where needed, rapid mobilization to collect supplemental data prior to impact by the oil release; and as required, data gathering from reference sites not impacted by the release.

A first step in characterizing conditions, both for baseline surveys and sampling after the release reaches shore, will be to perform site reconnaissance. This will include observations of:

- Site features and access constraints
- Groundcover and soil types
- Presence of structures, utilities, debris, or other obstacles
- Presence of oil odors or staining

### Representative Experience

Staff working at LBG conducted a **remedial investigation of the Lower Passaic River** Superfund Site for the USACE and USEPA. The program included extensive sediment coring, site characterization, water column water sampling for trace organics analyses, and bathymetric survey analyses. The data were geochemically evaluated to prepare a conceptual site model (CSM) interpreting the fate and transport of the sediment contamination. Our staff also managed community interviews and the preparation of a Community Involvement Plan.



GULF OF MEXICO OIL SPILL  
RECOVERY QUALIFICATIONS

**COASTAL AND  
ENVIRONMENTAL  
ENGINEERING SERVICES**

The site reconnaissance will include photo and video documentation, which will be georeferenced and stored in a GIS system. This information, plus evaluations of existing data, can be used to develop plans for site characterization.

LBG staff are experienced with all facets of the detailed field techniques and protocols that can be used to characterize both baseline and the post-impact conditions. Our field crews have the knowledge, capability, and expertise to cost effectively design and implement field programs.

Aspects of this work may include:

Site topographic surveys, using aerial photogrammetry and on-the-ground surveys, to prepare mapping and identify site features

Marine geophysical surveys, including bathymetric surveys, side-scan sonar surveys, and sub-bottom profiling to evaluate sediment texture, sediment contamination, and sediment stability

Biologically active zone surveys using sediment profile imagery and grab sampling

Sediment core collection by vibracoring, piston coring, ponar grab sampling, box coring, hand coring, etc.

Soil sampling using hand augers or, where necessary, direct push or hollow stem augers from a drill rig

Physical analysis of the sediment, including grain size, moisture content, and other geotechnical properties that will allow for the development and evaluation of remedial alternatives and remedial design

Chemical analysis for petroleum fingerprint and petroleum constituent analyses (e.g., volatile and semi-volatile organic compounds)

Water quality sampling to assess the impacts to the water column, including Van Dorn or Kemmerer samplers for discrete depth sampling, depth-integrated samplers, use of pumped water sampling techniques to collect large volumes of water and solids using filters, and adsorbent resin cartridges

Off-site laboratory analysis of environmental samples for chemical constituents and physical properties

On-site laboratory services, if required, for rapid characterization

Data validation and use of electronic data deliverables and databases such as EQuIS to manage and effectively share the collected data



GULF OF MEXICO OIL SPILL  
RECOVERY QUALIFICATIONS

COASTAL AND  
ENVIRONMENTAL  
ENGINEERING SERVICES

## Representative Experience

LBG recently acquired a division of Malcolm Pirnie that specialized in the management of contaminated sediments for government clients; most notably the USEPA and the USACE. For more than 10 years, this group was responsible for Operation and Management of the **Newark Bay Confined Disposal Facility (NBCDF) for the Port Authority of NY and NJ**. This project involved oversight and monitoring of disposal of 1.5 million cubic yards of contaminated dredged materials in a subaqueous disposal pit in New York Harbor. Work included all aspects of environmental compliance, including: coordination of all disposal requirements with contractors, identification of placement locations and project-specific operational requirements, field oversight of placement of dredged materials into the NBCDF and water quality monitoring during dredge disposal operations. Geotechnical analyses included assessment of dredged material behavior through field investigations and consolidation analyses for purposes of determining the ultimate capacity of the facility and the sequencing of future disposal activities.



Among the tools/experience that our team can bring to bear are oil fate and effects models developed for the Gulf, including a 3D hydrodynamic model for the Mississippi River delta region and the affected region of the Gulf of Mexico coastline. This model provides a numerical predictive tool to assess the short- and long-term ecosystem impacts from pollutants and re-suspended contaminated sediments on the wetlands along the coastline near the mouth of Mississippi River.

Long-term monitoring services can also be provided following remediation efforts to evaluate recovery. The following services can be provided, upon request:

- Long-term monitoring and assessment (chemical, acute and chronic biological testing)
- Source allocation and degradation rates in sediment, water, biota
- Construction of timelines for action, based on maximizing cumulative benefit
- Guidance for shoreline ecology and recovery studies and methods

## Chemical Fingerprinting and Geochemical Data Evaluation

Hydrocarbon production and shipping has been an important element of the economy along the Gulf Coast for many years. Specifically in urban areas, hydrocarbons may enter the waterways through various point and non-point sources. In order to establish impacts, separation of historic/background hydrocarbon contamination from the oil associated with the Deepwater Horizon incident will be required in some areas. Specifically, distinct oil releases have characteristic chemical signatures that can be identified using chromatographic “fingerprinting.” LBG used this technique during response to the Arthur Kill oil spill in New York Harbor to distinguish oil released by Exxon from both historic/background contamination and three subsequent spills.

LBG provides all necessary services and technical expertise to interpret the data that will be collected during the site assessment to meet the client’s specific objectives for impact assessment and response, cost evaluations, and/or litigation support. Our team of sediment engineers and scientists has access to state-of-the-art analytical and geostatistical tools to perform the analyses likely to be required, including:

- Comparison of petroleum fingerprint data
- Principal component analysis
- Assessment of petroleum weathering phenomena
- Delineation of the extent of contamination
- Inventory (mass) estimates.
- Contaminant fate and transport evaluations/modeling

GULF OF MEXICO OIL SPILL  
RECOVERY QUALIFICATIONS

**COASTAL AND  
ENVIRONMENTAL  
ENGINEERING SERVICES**

A thorough understanding of the site conditions is imperative to preparing valid assessments of damages that are accurate and defensible and to deploying response resources in an effective manner.

## Contaminant Fate and Transport Analysis

The study of contaminant fate and transport in the environment requires an evaluation of multiple lines of evidence to support and develop a conceptual site model (CSM) of the system. Geochemists use a range of tools to evaluate environmental data and to develop the CSM. For example, sediment cores that are finely-partitioned are evaluated to reconstruct a history of contaminant loading to the system. This evaluation involves the use of radionuclides to date certain time horizons and compare these time horizons to peak contaminant loading. These cores combined with surface sediment concentrations from depositional environments assist in reconstructing the depositional history. Geochemists also use sediment samples to characterize and fingerprint sources to the system. In addition to chemical data, geophysical data like bathymetric surveys and side-scan sonar are evaluated to assess sediment stability and sedimentation rates. Together, these tools and many more are combined to develop a CSM, which describes the fate and transport of chemicals in an estuarine system. Ultimately, a CSM that can model current conditions and how contaminants are moving in the system becomes an important decision-making tool for anticipate remedial and restoration activities.

## Sediment Remediation

Experience from prior oil spills shows that contaminants are likely to persist within the sediment matrix, requiring remediation of sensitive resource areas and sediments. In addition, these contaminated sediments that, if not addressed, can contribute to the spread of contamination via resuspension by storm flows and tidal energies, wind, bioturbation, etc. LBG has extensive capability in the preparation of designs and cost estimates for soil and sediment remediation.

We maintain the experts and technical staff to address all required aspects of soil and sediment remediation, including the following:

- Dredging and Excavation Design
- Capping and Isolation Design, including Confined Area Disposal (CAD) design
- Natural Recovery and Natural Attenuation Evaluations
- Innovative Technology Evaluation and Application (i.e., in-situ remediation and chemical treatment)
- Dredged Material Management, Handling, Treatment, and Beneficial Use
- Treatability Study Design, Testing, and Evaluation



## Human Health and Ecological Risk Assessment

Current forecasts indicate the potential for wide-reaching impacts from the Gulf Coast oil spill. Affected areas are likely to include sensitive habitat areas in addition to recreational areas and fisheries (e.g., beaches, waterfront parks, oyster beds). Unfortunately, these impacts will almost certainly create contaminant exposure pathways for human and ecological receptors, including consumption of contaminated fish/shellfish and direct contact/inhalation/ingestion hazards associated with contaminated environmental media. Should response planning require it, the LBG team can provide risk assessment services, including the development of Pathways Analysis Reports, Screening Level Ecological Risk Assessments (SLERAs), and Baseline Human Health and Ecological Risk Assessments.

Additional risk evaluation services that can be provided with our team partners include:

- Predictive assessment of air quality hazards via aerial transport and effects models of material produced from burning of organic contaminants
- Short-term effects assessment on fish and invertebrates
- Bioavailability of crude constituents and breakdown products
- Acute and chronic toxicity of water
- Bioaccumulation of oiled sediments - intertidal, sub-tidal, benthos
- Toxicity/carcinogenicity profiles
- Dispersant toxicity
- Assessment and incorporation of background (existing) risk factors
- Measuring and predicting changes in risks in response to cleanup or degradation
- Guidance for determining when a specific resource (e.g., shrimp fishery) can be considered safe for unrestricted use and other decision support regarding a return to food production

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## Hydrodynamic Processes and Engineering of Coastal Structures

LBG engineers and scientists are experienced in coastal engineering projects including berms and seawalls; numerical modeling; wave, coastal, hydrodynamic modeling; flood modeling; shoreline erosion mitigation; and harbor breakwater modifications. LBG staff successfully managed multidisciplinary engineering projects including construction management services, condition surveys, structural integrity investigations and design/bid reviews. Our responsibilities included coordination of multidisciplinary consultants and contractors; plan, specification, and cost estimate preparation of projects; and inspection of ongoing and completed projects.

# GULF OF MEXICO OIL SPILL RESPONSE, RECOVERY & RESTORATION

## Statement of Qualifications

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